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# ASSIGNMENT BOOKLET 3216 MATHEMATICS 33 UNIT 4

AUG 20 1991

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Teacher: \_\_\_\_\_

Module Grading: \_\_\_\_\_

Graded by: \_\_\_\_\_

Date Module Received:

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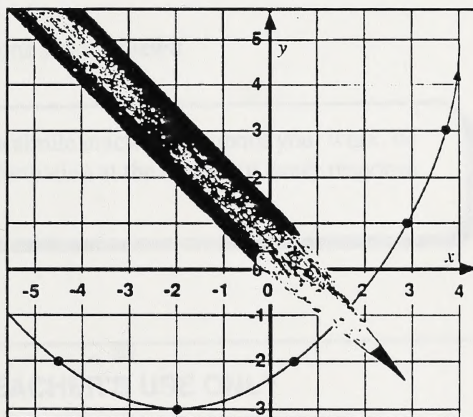
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# MATHEMATICS 33

## Quadratic Functions and Equations



Unit 4

## Assignment Booklet



**Distance  
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**Alberta**  
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Mathematics 33  
Assignment Booklet  
Unit 4  
Quadratic Functions and Equations  
Alberta Distance Learning Centre  
ISBN No. 0-7741-0226-8

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Your mark on this unit will be determined by how well you answer the questions in this booklet.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate topic.

The six topics that you studied in your unit are covered in this assignment booklet. The total value of these topics is 100 marks. Each topic is divided into several questions. The value of each question is stated in the left margin.

Be sure to proofread each answer carefully.

Do not hand in this booklet until all questions are completed.

**Faxing?**

If you are using a facsimile machine to submit your work, be sure to fill in the information at the bottom of every response page.

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**Summary**

	Total Possible Marks	Your Mark
Topic 1	20	
Topic 2	10	
Topic 3	25	
Topic 4	15	
Topic 5	20	
Topic 6	10	
	100	

**Teacher's Comments**

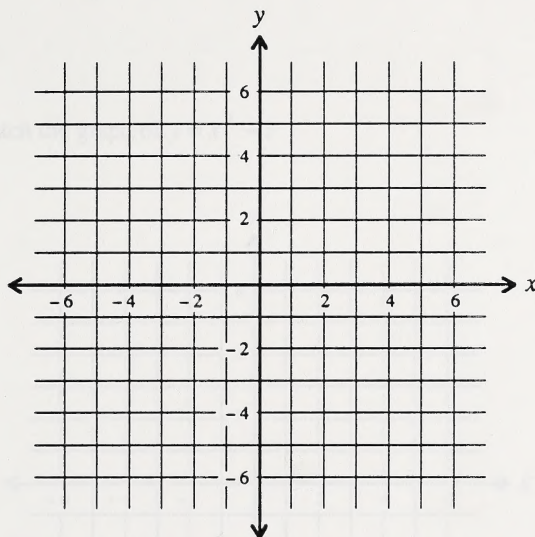




**Topic 1: Sketching Quadratic Functions**

①

1. Sketch the graph of  $y = x^2$ .



①

2. By looking at the equation of a function, how can you tell whether the graph of the function will be a parabola?

①


3. What determines whether a parabola opens upward or downward?

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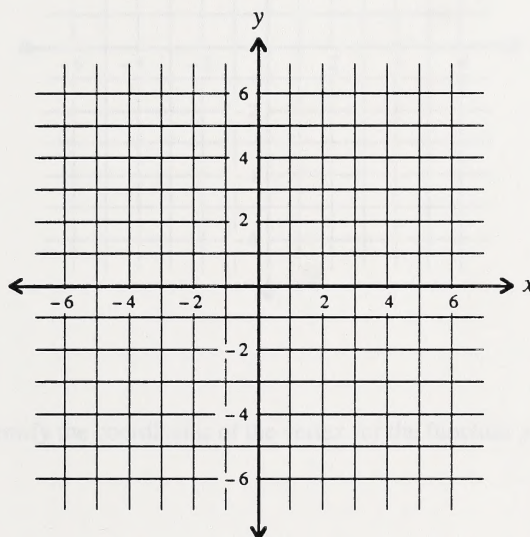
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①

4. What is the axis of symmetry of a parabola?

②

5. Sketch the graph of  $y = x^2 - 3$ .

①

6. Identify the coordinates of the vertex for the function  $y = x^2 + \sqrt{2}$ .

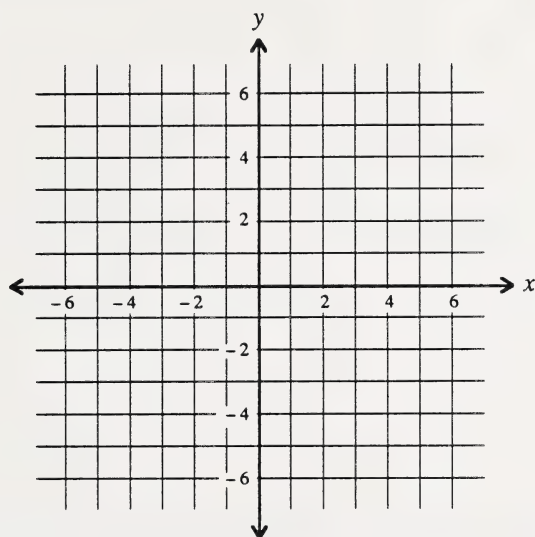
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②

7. Sketch the graph of
- $y = (x + 1)^2$
- .



①

8. Identify the coordinates of the vertex for the function
- $y = (x - 2)^2$
- .

①

9. Write the equation for the axis of symmetry for the following functions.

a.  $y = x^2 - 5$

①

b.  $y = (x + 3)^2$

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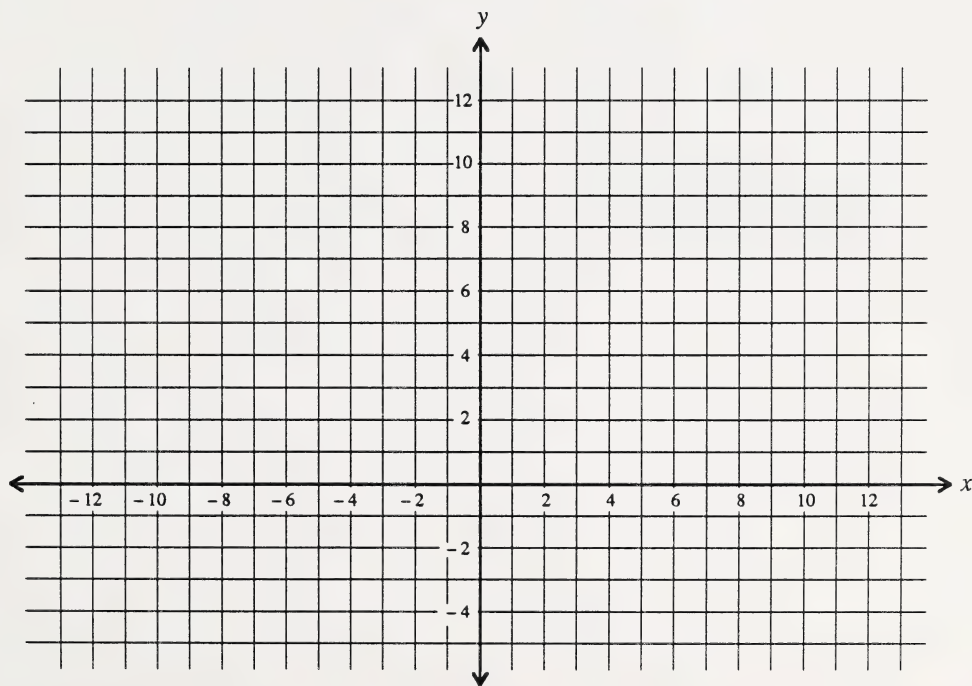




- ② 10. Describe how the graph of  $y = (x - 3)^2 + 5$  can be obtained from the graph of  $y = x^2$ .

11. Sketch the graph of each of the following functions.

② a.  $y = 2(x - 1)^2 + 2$



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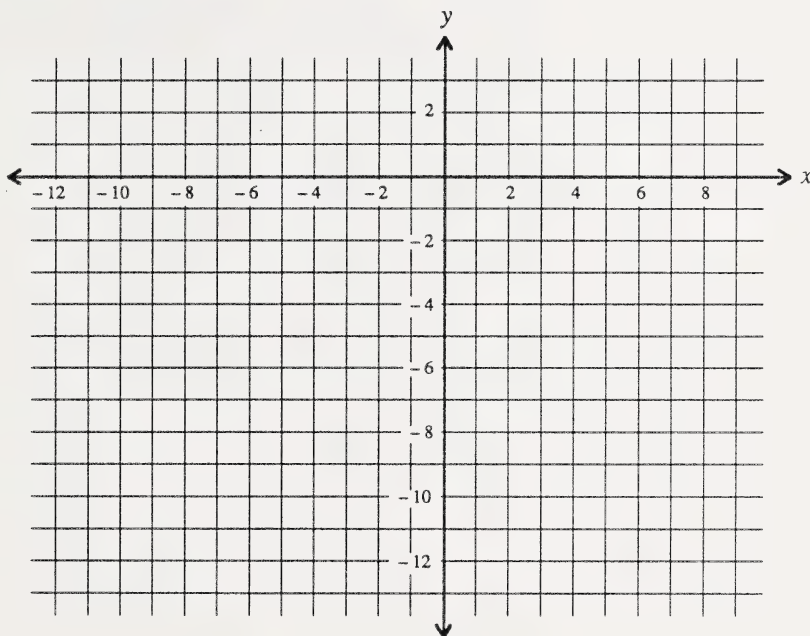
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②

b.  $y = -2(x+1)^2 - 2$



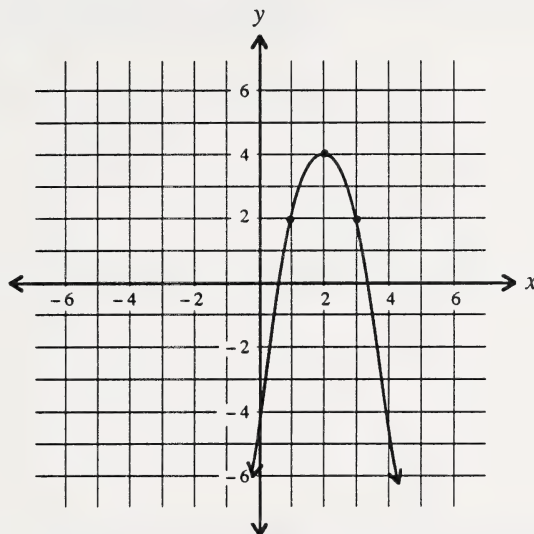
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②

12. Write the equation for the following parabola.

**Topic 1**

\_\_\_\_\_ marks

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**Topic 2: Completing the Square**

①

1. Why is it easier to graph a quadratic function if the equation is in completed square form rather than standard form?

①

2. What is the formal definition for a quadratic function?

①

3. For  $x^2 - 12x + c$ , what must  $c$  be in order for the trinomial to be a perfect square trinomial?

①

4. Write  $y = 2x^2 + 18$  in completed square form, and identify the coordinates of the vertex.

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②

5. Write  $y = -4x^2 - 20x$  in completed square form, and give the coordinates of the vertex.

④

6. Write each function that follows in completed square form, and identify the coordinates of the vertex.

a.  $y = 3x^2 + 6x - 17$

b.  $y = -2x^2 + 5x + 1$

**Topic 2**

\_\_\_\_\_ marks

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**Topic 3: Characteristics of Quadratic Functions**

1. What is the maximum or minimum value of a quadratic function?

②

2. How can you tell if a quadratic function has a minimum or a maximum by looking at the following?

①

a. the equation of the function

①

b. the graph of the function

④

3. For the quadratic function  $y = -2x^2 + 4x + 3$ , give the following:

a. the function in completed square form

b. the coordinates of the vertex

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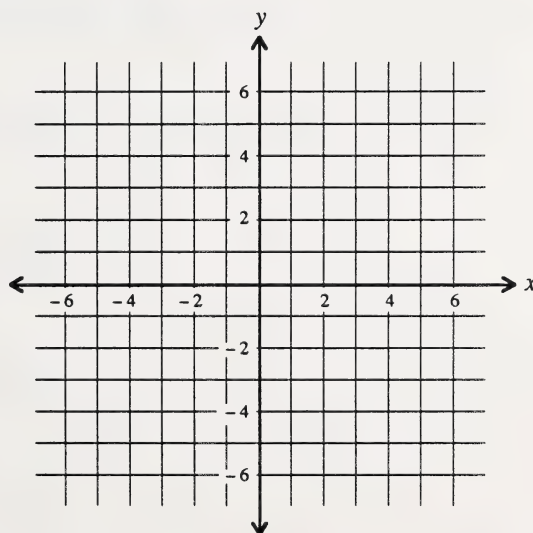
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- c. the maximum or minimum value
- d. the equation for the axis of symmetry
- e. the domain
- f. the range
- g. the y-intercept
- h. a sketch of the graph



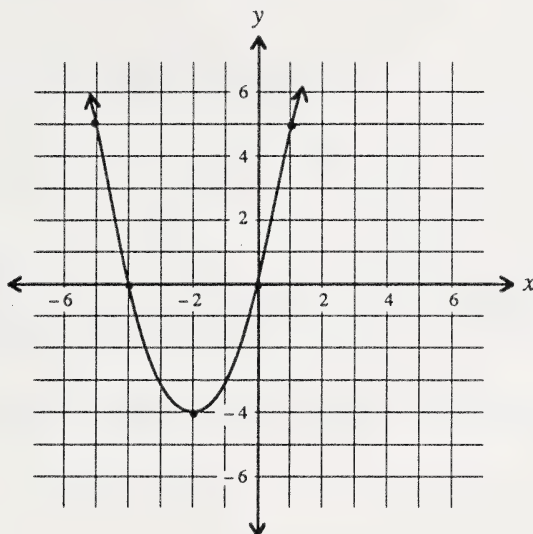
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④

4. For the quadratic function given, state the following:



- the coordinates of the vertex
- the maximum or minimum value
- the equation for the axis of symmetry
- the domain
- the range

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f. the y-intercept

g. the equation of the function

5. The trajectory of a projectile is described by the function  $h = -5t^2 + 140t$ , where  $h$  is the height above the ground in metres and  $t$  is the time in seconds. Find the following:

②

a. the time required for the projectile to reach the maximum height

①

b. the maximum height reached

①

c. the height above ground after 7.5 s

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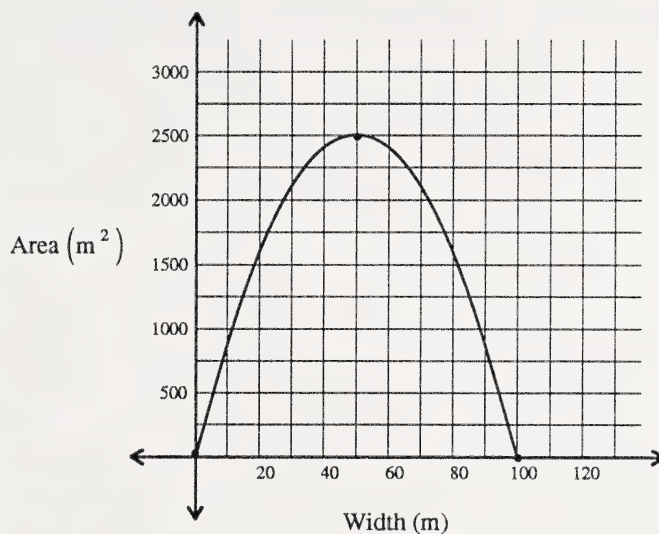
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6. The following graph shows the relationship between the width of a rectangular region and its area.



①

- a. Read the graph and identify the width that will give the maximum area.

①

- b. Identify the maximum area.

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7. The amount of wire available for fencing three sides of a community park is 1000 m. The shape of the park is a rectangle.

②

- a. What should the dimensions of this park be in order to obtain a maximum area?

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①

b. What is the maximum area?

④

8. Find two positive numbers whose sum is 26 and whose product is a maximum. What is the maximum product?

**Topic 3**

\_\_\_\_\_ marks

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**Topic 4: Solving Quadratic Equations**

②

1. Find the  $y$ -intercept and the  $x$ -intercept for the function  $y = x^2 + 6x - 27$ .

①

2. What is a quadratic equation?

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3. Solve the following quadratic equations.

①

a.  $2x^2 - 15x = 0$

①

b.  $3x^2 - 48 = 0$

①

c.  $x^2 + 25 = 0$

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4. Solve the following quadratic equations.

②

a.  $x^2 - 7x - 18 = 0$

②

b.  $4x^2 - 8x - 5 = 0$

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- ② 5. Find the  $x$ -intercepts for the function  $y = 6x^2 - x - 2$ .

- ① 6. Is  $-3$  a root of the equation  $2x^2 - x - 15 = 0$ ? Give a reason for your answer.

- ① 7. What is the relationship between the  $x$ -intercepts for a quadratic function and the roots of the corresponding quadratic equation?

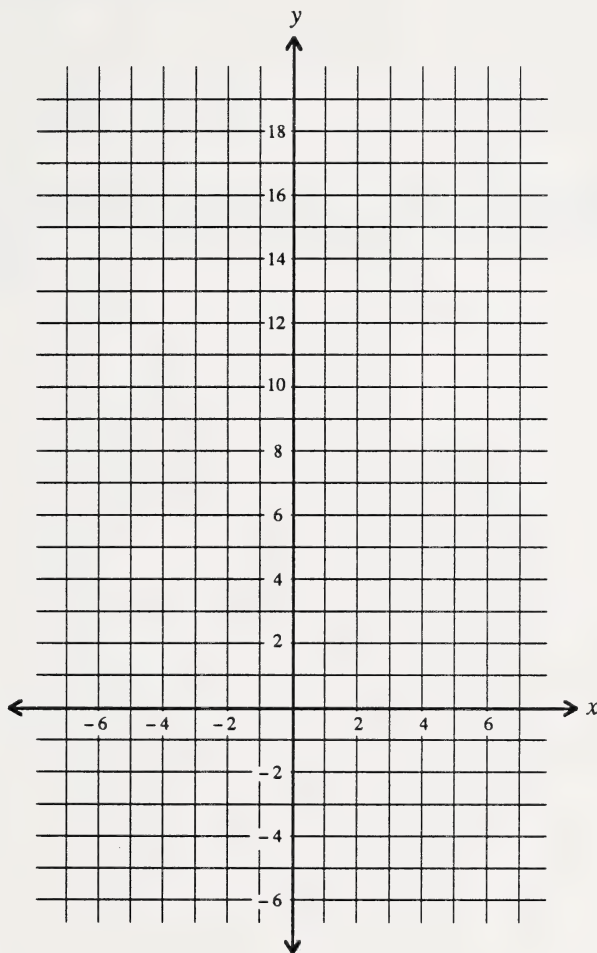
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- ① 8. Using the concept of translations, sketch the graph of  $y = x^2 + 5$ .

**Topic 4**

\_\_\_\_\_ marks

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**Topic 5: The Quadratic Formula**

①

1. Write the quadratic formula.

②

2. Find the roots of the quadratic equation  $x^2 - 10x + 20 = 0$  by completing the square. Give the decimal number approximations for the roots to the nearest hundredth.

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②

3. Verify that  $3 + \sqrt{5}$  is a root of the equation  $x^2 - 6x + 4 = 0$ .

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4. Find the roots for each equation that follows.

②

a.  $3x^2 - 2x - 2 = 0$

②

b.  $4x^2 + 20x + 25 = 0$

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②

5. What information can be determined about the graph of  $y = 2x^2 + 3x + 5$  by finding the roots of the corresponding equation?

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③

6. One side of a rectangle is 21 cm longer than the other side. A diagonal of this rectangle is 39 cm. Find the length and the width of this rectangle.

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③

7. The area of a rectangular field is  $3300 \text{ m}^2$ . Find the dimensions of this field if the length is 31 m more than the width.

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8. The trajectory of a projectile is described by  $h = -3t^2 + 120t$ , where  $h$  is the height above ground in metres and  $t$  is the time in seconds. Find the following:

②

- a.  $t$  when  $h$  is equal to 480 m

①

- b.  $h$  when  $t$  is equal to 40 s

## Topic 5

\_\_\_\_\_ marks

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**Topic 6: Extensions of Quadratic Equations**

②

1. Solve the equation  $\sqrt{3x-8} + x = 4$ .

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③

2. Solve the equation  $\frac{2x^2}{5x-1} - 3 = \frac{3x+2}{5x-1}$ .

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3

3. The sum of a number and 12 times its reciprocal is 8. What is/are the number(s)?

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②

4. For the graph defined by  $y = 2\sqrt{x^2 + 2x + 1}$ , find the ordered pairs that have a  $y$ -value of 4.

**Topic 6**

\_\_\_\_\_ marks

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